Introduction

Karst features range from sinkholes, vertical shafts, losing streams and springs, to complex underground drainage systems and caves. These features are the result of the dissolving action of water on carbonate bedrock. Underground drainage systems can be extensive; as a result, specific karst features can be impacted by disturbances occurring miles from the affected area.

Associated with karst features are unique plants and animals that have at least part, if not all, of their life cycle dependent upon the unique environment of these systems. Even slight alterations or disturbances can have significant impacts upon these plants and animals. It is of utmost importance that construction projects in known karst topography be extremely sensitive to the potential impacts that may occur and that all possible precautions be taken to prevent or reduce those impacts.

Karst Identification

It is often difficult to clearly delineate the type and extent of karst features in an area due to the complex and varied processes involved in their formation. However, it is important to correctly identify and delineate karst features so that these areas are managed properly for the resident species (e.g., a bat hibernaculum or a bat maternity cave).
→ Initial investigation should include the use of state, federal, and private geotechnical data. Observation by a geotechnical consultant should be considered if existing data indicate the presence of karst features in the vicinity. Initial geological investigation of the immediate and surrounding area of the proposed project site should be conducted to determine the presence and type of karst features.
→ The identification and delineation of karst features should include the following: location, distribution, and dimensions of rock cavities; location, distribution, and dimensions of soil voids; depth and configuration of the rock surface; variation in the physical characteristics of the subsurface soils and rock; groundwater quality and flow patterns.

Access and Staging Area Management Recommendations

Staging areas are those short- or long-term sites within a construction or development area where most equipment and materials are stored. These areas are often accessed frequently, and when fuel and oil are stored here, the potential for runoff and erosion in these areas may be high.
→ Erosion and sediment controls should be installed and maintained to prevent discharge from the site.
→ Staging areas for crew, equipment, and materials should be established well away from karst features such as caves, sinkholes, and springs, and highly erodible soils when practical.
→ Stationary fuel and oil storage containers should remain within a staging area or another confined area to avoid accidental introduction into the groundwater.
→ Excess concrete and wash water from trucks and other concrete mixing equipment should be disposed of well away from karst features, streams, and wetlands.
→ If temporary roadways must be built, ensure that roadways are of low gradient with sufficient roadbed and storm water runoff drains and outlets. Appropriate containment basins, silt fences, filter strips, etc. should be included for retention of storm water runoff as a means for reducing sedimentation introduction into karst features and groundwater.

Buffer Zone Management Recommendations

The buffer zone is the vegetated area immediately surrounding the karst feature, which helps slow runoff and filter out pollutants that might enter karst systems. A buffer zone of at least a 100-foot radius should be maintained on all sides around caves, sinkholes, and springs.
→ Buffer zones located down slope of construction areas should be physically screened with sediment controls, such as silt fences or filter strips. Sediment controls should be monitored after rain and maintained for the duration of the project.
→ General application of pesticides, herbicides, or fertilizers within the buffer zone should be prohibited to avoid contamination due to overspraying or runoff. Fertilizer use or spot application of pesticides and herbicides is acceptable if appropriate non-restricted chemicals are used.
→ All buffer zones disturbed by the project should be revegetated immediately following or concurrent with project implementation. Native trees, shrubs, and grasses should be planted to ensure long-term stability in areas where the soil erosion threat is not critical. Annual non-native grasses such as rye or wheat may be planted in conjunction with native species to provide short-term erosion control. Areas judged to be subject to immediate soil loss due to steep slopes or other factors causing critical erosion

conditions may be planted with non-native mixtures to assure rapid establishment and erosion control.
→ Post-construction evaluation of vegetation establishment should be conducted at one month intervals for at least three months after completion of the project. Any recommended sediment controls should be inspected at these times. If determined beneficial to soil stability and not adversely impacting site function and/or aesthetics, recommended sediment controls should remain permanent.

Karst Area Management Recommendations

Karst areas provide habitat for a diversity of highly specialized and sensitive vertebrate and invertebrate animals. These areas also provide an important filtration system for the underground water humans use and drink. For this reason, it is important to avoid rerouting waterways and drainage patterns in karst areas.
→ All construction debris, refuse, discarded containers, and any other waste materials should be stored away from karst areas. Take care to contain this material to prevent its accidental introduction into caves, sinkholes, or springs as a result of clean-up activities, runoff, flooding, wind, or other natural forces.
→ Sedimentation and erosion controls appropriate to soil type, water flows, exposure, and other site specific factors should be implemented during all phases of construction.
→ Sediment and erosion controls should be monitored periodically. Clean, repair, and replace controls as necessary.
→ Final revegetation of disturbed areas should use native plant species. Grasses, such as rye or wheat, may be used with non-native mixtures initially to maintain soil stability until establishment of native vegetation can be completed. A monitoring program should be included in the project proposal to ensure successful revegetation efforts.
→ All temporary erosion and sediment controls should be removed (unless removal would cause further disturbance) and disposed of within 30 days after final site stabilization is achieved or after temporary practices are no longer needed.
→ All debris and excess materials should be removed and properly disposed of upon completion of project.

Information Contacts

For further information regarding regulations for development in karst areas, contact:

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Missouri Department of Natural Resources
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U.S. Army Corps of Engineers
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U.S. Environmental Protection Agency
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Kansas City, KS 66101
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Disclaimer

These Best Management Practices were prepared by the Missouri Department of Conservation with assistance from other state agencies, contractors, and others to provide guidance to those people who wish to voluntarily act to protect wildlife and habitat. Compliance with Best Management Practices is not required by the Missouri wildlife and forestry law nor by any regulation of the Missouri Conservation Commission. Other federal, state or local laws may affect construction practices.